BELLSOUTH

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October 10, 2001

EX PARTE OR LATE FILED

WRITTEN EX PARTE

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
The Portals
445 12th Street, S.W., Room TWB-204
Washington, D.C. 20554

Re: CC Docket No. 96-98

Dear Ms. Salas:

On October 10, 2001 I sent the attached letter to Michelle Carey, Chief of the Common Carrier Bureau's Policy and Program Planning Division. Copies of the letter have also been sent to the following Commission staff members: Kyle Dixon, Matt Brill, Sam Feder, Jordan Goldstein, Jeffrey Carlisle, Julie Veach, and Jeremy Miller. The letter offers technical information in support of BellSouth's position that it is not obligated to provide CMRS providers access to unbundled network elements for linking their cell sites to components of their internal networks.

In accordance with Section 1.1206(b)(1), I am filing two copies of this notice and attachments with you and ask that you include them in the record of CC Docket

No. 96-98. If you have any questions concerning this, please call me at 202.463.4113.

Sincerely,

Kathleen B. Levitz

Attachments

cc: Michelle Carey (w/o attachments)
Kyle Dixon (w/o attachments)
Matt Brill (w/o attachments)
Sam Feder (w/o attachments)
Jordan Goldstein (w/o attachments)
Jeffrey Carlisle (w/o attachments)
Julie Veach (w/o attachments)
Jeremy Miller (w/o attachments)

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October 10, 2001

WRITTEN EX PARTE

Ms. Michelle Carey, Chief
Policy and Program Planning Division
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, DC 20554

Re: **CC Docket No. 96-98**

Dear Ms. Carey:

On June 18, 2001 and August 21, 2001, BellSouth met with Commission Staff to discuss the circumstances under which ILECs should be required to provide CMRS providers with access to unbundled network elements ("UNEs"). In this letter BellSouth not only offers technical information to supplement those earlier *ex parte* meetings, but also to respond to *ex parte* presentations submitted on July 27, 2001, by counsel for AT&T Wireless, Nextel Communications, Inc. and VoiceStream Wireless Corporation.

This letter and its attachments clearly demonstrate that CMRS base stations are not the equivalent of an ILEC end office as claimed by CMRS carriers, thereby supporting BellSouth's position that it should not be required to offer dedicated transport to the CMRS providers as a UNE.

As our information sources we rely upon three publications from two of the major providers of CMRS switching networks, Lucent and Nortel. Two of the three documents can be readily accessed from the vendors' web sites at:

1. **http://nortelnetworks.com/products/01/cdma/index.html, and**
2. **http://lucent.com/knowledge/documentdetail/0,1494,inContenId_10609-inLocaleId+1,00.html**

The third document, which may be obtained from Nortel, is designated Nortel document 50171.16/10-97 Issue 1. This document, known as Public Carrier Networks DMS-100 Wireless Systems, describes the functions of various wireless network components. BellSouth has attached copies of all the relevant portions of this document for your convenience.

In their *ex partes*, the wireless carriers suggest that the base station is the equivalent of the wireline end office. After comparing the base station to a wireline wire center, they assert that the base station provides connectivity to the Public Switched Telephone Network (PSTN) through the wireline wire center. Using the publications identified above, BellSouth refutes these allegations.

NORTEL Documentation

On its web site, NORTEL provides information regarding CDMA Networks, including a depiction of the configuration of the CDMA wireless network. The network diagram in this web site document, which we attach as "Exhibit A," clearly shows that it is the Mobile Switching Center, and not the base station, that accomplishes connectivity with the PSTN via interconnection link to the PSTN through a wireline wire center. The network diagram clearly shows that the CDMA Cell Site/Base Station first connects to a Base Station Controller, ("BSC"). The BSC then connects to the Mobile Switching Center, which, in turn, connects to the wireline wire center, which links the CMRS network to the public switched telephone network (PSTN).

We also attach as "Exhibit B," the CDMA Base Station Portfolio section of the CDMA Networks document. That document clearly states that the BSC connects CDMA base stations to mobile switching centers. Because it clearly shows that the base station not only is at least three levels removed from connectivity to the wireline wire center, but also only functions at the direction of the mobile switching center, this document absolutely supports BellSouth's position that the "base station" is not the equivalent of the wireline end office.

Figure 2 of Nortel's technical document 50171.16/10-97 Issue 1, (DMS 100 Wireless Services and Features), attached as "Exhibit C," clearly shows the wireless network as having two distinct components, the mobile switching center and the mobile radio system, depicted as the DMS-100 Switching Center, and the CDMA BSC. Figure 2 irrefutably establishes that switching within the wireless network and connectivity to the PSTN is accomplished not through any equipment at the cell site, but rather through the DMS-100 Switching Center. Figure 2 also clearly shows that the CDMA Base Transceiver Station is a component of the CDMA BSC that can only connect to the PSTN through the DMS-100 Switching Center, not the cell site. Figure 3, entitled DMS-100 Wireless System Hardware and attached as "Exhibit D," also offers additional documentation establishing that switching does not occur at the Base Transceiver Station.

The Hardware Requirements section of this technical document is attached as "Exhibit E." In that section, at page 8, NORTEL defines the function of the Base Transceiver Station, or BTS: "BTSs provide the air interface to the CDMA mobile phone." This document states, and Figure 3 illustrates, that the BTS is only a component of the BSC. Defining the functions of the BSC, the Hardware Requirements section states that "the BSC provides CDMA voice coding, intra-system soft handoff and advanced power control required by the CDMA technology."

Exhibit E contains additional information about the two system components that comprise the DMS-100 Switching Center, the Fiberized Link Interface Shelf (FLIS) or Link Peripheral Processor (LPP) and the Digital Trunk Controller (DTC). Nortel describes the FLIS/LPP component as providing an interface to the radio subsystem components for wireless messaging. Nortel defines wireless messaging is defined to be the messages that "include information associated with mobile phone call set-up, registration, and intersystem handoff control." The second component of the Switching Center, the DTCs, "provides voice trunks between the DMS-100 Wireless system and the radio subsystem, and trunking to the PSTN or wireless network."

Six-Way Soft Handoff is defined on page 11 of this document as follows: "The NORTEL CDMA radio system supports six-way soft handoff as an additional feature designed to ensure call quality and minimize dropped calls. Soft handoff is a method for a mobile phone to simultaneously communicate with multiple BTSs while transitioning coverage areas and while in difficult radio environments."

Review of the definitions of the BTS and the BSC clearly show that the BTS has only limited functionality within the wireless network. More significant for regulatory purposes, this review definitively shows that the BTS is not the equivalent of the ILEC end office and that neither the BST, nor the BSC perform any switching function. The attached documentation clearly shows that the combined FLIS/LPP and DTC components of the DMS-100 Switching Center drive and control functions both within the radio component of the DMS-100 Network and its switching component.

Lucent Documentation

We have attached a copy of Lucent Technologies' web site Application Guide as "Exhibit F." This document clearly establishes that the Mobile Switching Center provides switching between the wireless network and the PSTN and moves the traffic within the wireless network.

In the Common Application section of the Application Guide, Lucent states that for the CBX 500, GX 500, and MSC 2500 Switches in Wireless Networks

"supporting intra-MSC soft handoffs and voice coder hunting requires point-to-point communications between each switching module (SM) in the Mobile Switching Center (MSC)." In the Supporting CMDA Soft Handoffs section of the Application Guide LUCENT states that "when a user places a call to a CDMA wireless network, multiple Mobile Switching Centers (MSCs) may receive that call's signal simultaneously. The MSC with the highest signal strength becomes the primary MSC for communications with the Public Switched Telephone Network (PSTN). As the user moves, that primary MSC's signal strength may decline while another MSC's signal strength increases. If the primary MSC's signal strength becomes too weak, the network may select an alternate MSC with a stronger signal to receive the call from the user. The alternate MSC transmits the call to the initial MSC through a wired frame relay or ATM network over T1s. The initial MSC maintains the connection with the PSTN for the duration of the call. This process is known as a soft handoff, because the alternate MSC receives the signal before the handoff takes place.

Lucent further states in this section that CDMA networks that use Lucent 5ESS switches in the MSC – also known as the Mobile Telephone Switching Office (MTSO) – will have an ATM network built to support soft handoffs between switches. Each 5ESS switch connects to multiple base stations as shown in Figures 2 through 5 of Exhibit F. As the user moves from one base station to another, the 5ESS switch initially receiving the call performs a soft handoff. If the user moves to a base station that is connected to a different switch, the transmission is sent between the two 5ESS switches using an ATM network. Such soft handoff does not equate to switching.

The attached Exhibits clearly show not only how the MSC/MTSO provides connectivity and switching between the wireless network and the PSTN, but also that it is the MSC/MTSO that performs the switching function within the wireless network. Based upon the information in these NORTEL and Lucent publications, it is clear that the wireless network element that is equivalent to the ILEC end office is the MSC/MTSO. These same sources also clarify that the base station is limited to participation in soft handoff, but only at the direction and under the control of the MSC/MTSO.

Verizon's Response

In its letter to the Commission of August 22, 2001, Verizon Communications also responded to the CMRS providers' July 27, 2001 *ex partes* on this subject. In that letter Verizon states, and we agree,:

> Insofar as is relevant here, the Commission's rules require incumbents to provide such unbundled dedicated transport facilities only between wire center or switches owned by the requesting carriers. *See* 47 C.F.R §51.319(d)(1)(i). As a result, incumbents would need to provide unbundled dedicated transport only if the MSC and the cell site both were

switches or wire centers owned by the requesting CMRS providers. But they are not – while the MSC is unquestionably a switch, cell sites do not meet the Commission's own definition of either a switch or a wire center. (Footnotes omitted).

47 C.F.R. §51.319 (c)(1)(iii)(A) describes the relevant switching functions as:

> The basic switching function of connecting lines to lines, lines to trunks, trunks to lines, and trunks to trunks, as well as the same basic capabilities made available to the incumbent LEC's customers, such as a telephone number, white page listing and dial tone.

Verizon's letter correctly observes that:

> Cell sites do not perform any of these functions. A cell site does not serve a designated set of end users among whom calls are switched and, therefore, does not connect lines or trunks to each other or provide telephone numbers, white page listings, or dial tone. Nor is it used to connect (*i.e.,* switch) subscriber loops to the incumbent's switch for routing. Instead the cell site acts as a transmitter/receiver that must communicate with the MSC for location information and switching functions. An individual handset "registers" with the nearest cell site when it is turned on, and a call in progress is "served" by that cell site only for the length of time that the hand set is within range of that site, based upon instruction the cell site receives from the MSC. As the hand set moves, the call is handed off to one or more cell sites, as instructed by the MSC, and each such cell site must remain in communication with the MSC in order to receive handoff and other instructions that allow the connections to be maintained. Furthermore, a call from one cellular handset to another cellular handset being handled by the same cell site must transit the MSC. Thus it is the MSC and not the cell site that is providing the switching functionality. Simply put, a cell site does not connect calls and therefore cannot be considered equivalent to a switch."

BellSouth agrees with Verizon's analysis and conclusion and supports its position.

Conclusion

The Commission has defined a wire center as "the location of a local switching facility containing one or more central offices." 47 C.F.R.§54.5. The technical information drawn from Wireless Industry Vendor publications attached to this letter and information contained in the Verizon August 22, 2001 letter to the Commission, establish that the wireless cell site is not a switch, and consequently cannot reasonably be viewed as similar to or the equivalent of an ILEC end office switch or wire center. Because the cell site does not meet

Commission-defined parameters for end offices and wire centers, ILECs should not be required to offer CMRS providers as unbundled network elements the facilities linking these cell sites within the wireless network.

We look forward to the opportunity to discuss this issue more fully with you and your staff.

Sincerely,

Kathleen B. Levitz

Attachments

cc: Kyle Dixon
Matt Brill
Sam Feder
Jordan Goldstein
Jeffrey Carlisle
Julie Veach
Jeremy Miller

EXHIBIT A

Information:
News · In the News · Document Library · Success Stories · Tools & Demos ·

Products:
Circuit Switched Data · Base Station Portfolio · OAM&P · Switching Portfolio · 3G Migration ·

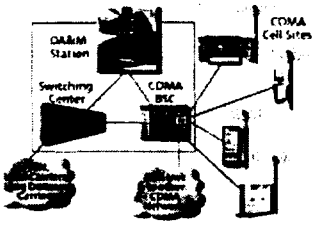
Purchasing Information

Service & Support:
Training, North America · Training, All Regions · Tech. Documentation, North America · Tech. Documentation, All Regions

Related Info:
CDG Web Site · Preside for Wireless Networks

CDMA Networks

Provides advanced wireless features that allow network operators to compete successfully anywhere in the world



View Network Diagram

Our CDMA solution offers a robust wireless portfolio that allows network operators to compete successfully with the most advanced technology available today while being prepared for the technology of tomorrow. Based on our DMS-MTX switching platform, the CDMA solution provides operators with a complete range of wireless options that expand subscriber services, optimize network performance, lower capital costs, and reduce the overall cost of ownership.

With CDMA technology powering your network, you can position yourself at the forefront of the next generation of communication technologies. CDMA will be the driving force behind true wireless Internet access and mobile technology solutions that will inspire a new era of high-speed, anytime-anywhere information access. Our CDMA solution will help you prepare your infrastructure to profit from the delivery of highly targeted and efficient solutions to your customers.

Features

The Nortel Networks CDMA solution:

- Increases RF capacity through unique advanced power control algorithms that reduce interference from other handsets, as well as through a high power (12.5 Watt) forward link
- Minimizes dropped calls with high-speed soft handoff algorithms and our innovative 6-way intelligent soft handoff
- Reduces capital costs since our advanced handoff triggers eliminate the need for beacon cells
- Minimizes dropped calls and base station coverage overlap through Intersystem Soft Handoff
- Increases revenue potential from subscriber services portability allowing seamless roaming to other networks
- Allows for more subscribers and revenue due to higher system capacity
- Creates additional revenue opportunities through attractive digital services
- Provides near wireline voice quality
- Offers inherent call security through CDMA advanced coding techniques
- Prolongs battery life, thereby encouraging users to leave their phones on and accept more calls, which in turn increases air time usage operator revenue
- Lowers capital investment in excessive cell sites and associated acquisition cost through larger cell site radius

Benefits

EXHIBIT B

Information:
News · In the News · Document Library · Success Stories · Tools & Demos ·

Products:
Base Station Controller · Metro Cell · Metro Cell with CGS · Mini Cell · Fiber Optic Microcell · Rural Cell · Repeaters ·

Purchasing Information

Related Info:
CDMA Networks ·

CDMA Networks

CDMA Base Station Portfolio

Provides a complete selection of CDMA solutions to support markets ranging from extreme rural to dense urban areas

Our CDMA Base Station Portfolio connects the DMS-MTX or DMS-100 Wireless to cell sites to perform advanced CDMA mobility functions in a range of challenging environments. With features such as soft-handoff and advanced mobile power control, the Base Station Portfolio uses a unique packet-based architecture that provides an easy transition to high-speed, high-bandwidth ATM networks.

The CDMA Base Station Portfolio uses our unique, intelligent 6-way soft handoff technology to permit six simultaneous cells or sectors to be maintained within a mobile unit's active set of soft handoff candidate cells. Combined with our high-speed soft handoff methods, the Base Station Portfolio allows CDMA operators to significantly reduce the potential for dropped calls.

CDMA Base Station Portfolio

- **Base Station Controller** - Connects CDMA base stations to mobile switching centers to enable highly efficient backhauls in the network
- **Metro Cell** - Provides indoor and outdoor CDMA coverage for metropolitan applications at both 800 MHz and 1900 MHz
- **Metro Cell with CGS** - Provides expanded Metro Cell features in the same cabinet footprint
- **Minicell** - Offers a cost-effective solution for wireless coverage in special areas
- **Fiber Optic Microcell** - Provides cost-effective extension or reinforcement of coverage in challenging niche markets
- **Rural Cell** - Extends coverage to rural and remote areas
- **Repeaters** - Extend coverage to areas where additional capacity is not required

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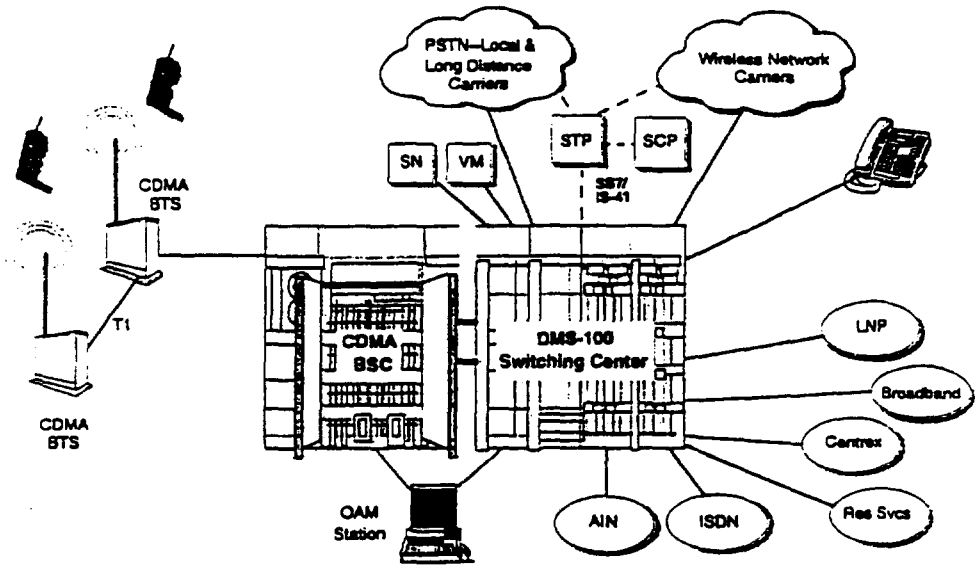
EXHIBIT C

2

Services and Features

The DMS-100 Wireless system provides an extensive list of revenue-generating wireless and wireline services. It also allows service providers to maximize marketplace differentiation and revenue potential by offering subscribers the convenience of integrated services such as wireline/wireless voice mail and single number simultaneous/sequential ringing. Figure 2 shows some of the high-level services and features offered by the DMS-100 Wireless system.



Abbreviations: BSC, Base Station Controller; BTS, Base Transceiver Station; CDMA, Code Division Multiple Access; ISDN, Integrated Services Digital Network; LNP, Local Number Portability; OAM, Operations, Administration, and Maintenance; PSTN, Public Switched Telephone Network; SN, Service Node; SCP, Service Control Point; STP, Signaling Transfer Point; VM, Voice Mail

Figure 2. DMS-100 Wireless Services and Features

Wireline Services

Like the DMS-100 system, the DMS-100 Wireless system offers the following wireline services and more:

- National ISDN-2/3 BRI and PRI
- Custom Local Area Signaling Service
- Meridian Digital Centrex
- Local Number Portability
- Wideband Data Services
- Automatic Call Distribution
- Advanced Intelligent Networking Releases 0.1 and 0.2
- TR-303 Access Interface

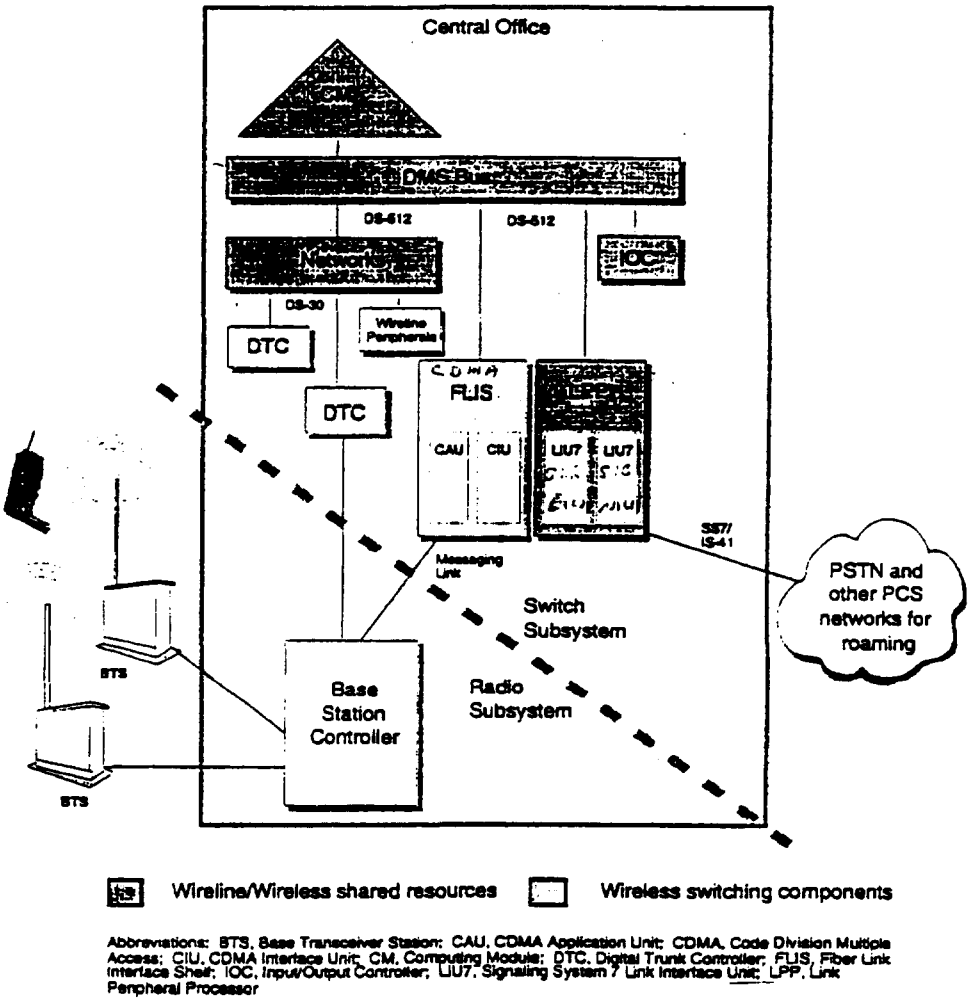
For a more detailed list of wireline services, please refer to the *DMS-100 Feature Planning Guide* (50004.11). Call 1-800-4 NORTEL to order the latest issue.

EXHIBIT D

3

System Description

The DMS-100 Wireless system offers true software integration, allowing the system to support both wireline and wireless capabilities with shared hardware components, as illustrated in Figure 3. This level of integration allows for significant operating efficiencies, including sharing of signaling links (i.e., SS7 and IS-41) and interswitch trunks by wireline and wireless subscribers.



Abbreviations: BTS, Base Transceiver Station; CAU, CDMA Application Unit; CDMA, Code Division Multiple Access; CIU, CDMA Interface Unit; CM, Computing Module; DTC, Digital Trunk Controller; FLIS, Fiber Link Interface Shelf; IOC, Input/Output Controller; LIU7, Signaling System 7 Link Interface Unit; LPP, Link Peripheral Processor

Figure 3. DMS-100 Wireless System Hardware

To support wireless on an existing DMS-100, typical systems would only require two new cabinets and the radio subsystem. The wireless components of the system are described below.

EXHIBIT E

Hardware Requirements

Summary of Hardware Requirements

- *DMS-100 with Series 60 Processor or higher; Series 70 EM is recommended for larger systems*
- *LPP or FLIS with CIUs and CAUs*
- *DTC to support wireless voice traffic*

- **Fiberized Link Interface Shelf (FLIS) or Link Peripheral Processor (LPP)**
  This cabinet is equipped with CDMA Interface Units (CIUs) and CDMA Application Units (CAUs), which provide an interface to the radio subsystem components for wireless messaging. The messages include information associated with mobile phone call set-up, registration, and intersystem handoff control.
- **Digital Trunk Controllers (DTCs)**
  DTCs provide voice trunks between the DMS-100 Wireless system and the radio subsystem, and trunking to the PSTN or wireless network.
- **Base Station Controller (BSC)**
  The BSC provides CDMA voice coding, intra-system soft handoff and advanced power control required by the CDMA technology. The BSC is collocated with the DMS-100 Wireless system.
- **Base Transceiver Stations (BTS)**
  BTSs provide the air interface to the CDMA mobile phones. Many BTSs are required to cover a given geographical area. They are collocated with the antenna towers commonly referred to as "cell sites."
- **Processor (baseline)**
  The Series 60 processor is the baseline processor required for DMS-100 Wireless systems. The Series 70 Extended Memory (EM) processor is required for larger wireless systems. (The 70 EM processor doubles the on-board memory capacity of the Series 70 processor to 512 megabytes.)

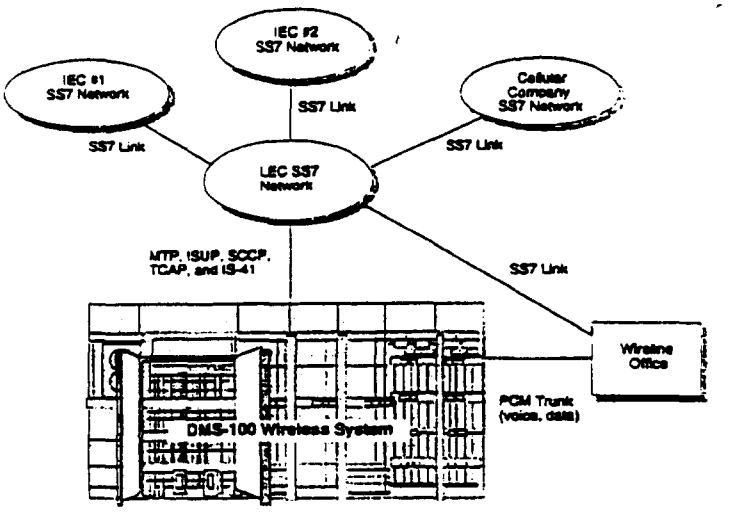
In addition to the minimum requirements outlined above, customer-defined conditions, subscriber expectations, and link capacity may drive upgrades in the following subsystems: ENET/JNET expansion; MTD, EDRAM, Input/Output Controller (IOC) interface circuit packs (i.e., SLM III), disk drives; Signaling System 7 (SS7) link interface units (LIUs).

Commercial Power

The DMS-100 Wireless system requires commercial AC power at the central office and all remote locations. Within the central office, no special external power supply is needed beyond the standard central office power requirements.

SS7 Network Interfaces

The DMS-100 Wireless system provides integrated Signaling System 7 (SS7) messaging, allowing service providers to send wireline and wireless messages on the same SS7 link. If the service provider has an existing SS7 link between the switch and a serving Signaling Transfer Point (STP), migration to the DMS-100 Wireless system does not require additional links or trunk loops, provided the physical messaging throughput of the existing links is not exceeded. A typical example of SS7 connectivity is shown below in Figure 4.



Abbreviations: IEC, Interexchange Carrier; ISDN, Integrated Services Digital Network; ISUP, ISDN User Part; LEC, Local Exchange Carrier; MTP, Message Transfer Part; SCCP, Signaling Connection Control Part; TCAP, Transaction Capabilities Application Part

Figure 4. Example of SS7 Connectivity

External Trunks and Call Routing

Public and private switches used for wireline and/or wireless networks can be connected to the DMS-100 Wireless system using analog trunks or digital trunks. External digital trunks interface with the DMS-100 Wireless system via circuit packs mounted in a Digital Trunk Controller (DTC), Line Trunk Controller (LTC), or Remote Switching Center (RSC). Analog trunks interface with the DMS-100 Wireless system via circuit packs mounted in a Maintenance Trunk Module (MTM).

The wireless or wireline subscriber can call:

- Any other subscriber within the same PCS network, or connected PCS network
- Any subscriber within the North American public network, or connected network (including local, long-distance, and international calls)
- Any subscriber within a connected cellular network
- Numbers with special area codes (500, 700, 800, and 900)
- 0-, 0+, and 00 calls
- Emergency 911
- 411/611 calls (directory assistance, etc)
- Feature code calls with special prefixes defined by the service provider
- 10XXX calls to select a carrier

Operator Services

The DMS-100 Wireless system supports the following:

- LEC- or IXC-based operator services
- Direct link from the wireless subsystem

411/611 Services

The DMS-100 Wireless system can provide two configurations for routing 411/611 calls, depending on the needs of the carrier:

- LEC-based Directory Assistance (DA)
- IXC-based DA

Equal Access

The DMS-100 Wireless system supports the following equal access trunks:

- Feature Group D (FGD)
- Feature Group B (FGB)
- Feature Group C (FGC)

In addition, the DMS-100 Wireless system

- maintains equal access capabilities for existing DMS-100 customers
- supports existing configurations on the DMS-100 system for wireline customers
- allows both wireline and wireless service providers to utilize the existing physical trunk facilities to other offices
- allows evolution to provide additional equal access support in future releases

911/E911 Services

For existing DMS-100 wireline customers, the 911/E911 services is not affected by migration to the DMS-100 Wireless system. For wireless customers, an emergency feature on the wireless side of the switch allows a 911 call to be routed to different seven-digit directory numbers based on the originating cell site.

The calling Mobile Identification Number (MIN) can be delivered depending on the trunk signaling of the circuit used to handle the call and the Calling Line Identity Restricted (CLIR) status of the caller. The service provider may set up translations to route the call to a trunk that provides calling number delivery.

Emergency calls from wireless subscribers are allowed without validation or authentication. Emergency calls are allowed even when the subscriber has not registered.

The Nortel CDMA Radio Subsystem

The DMS-100 Wireless system connects to the globally proven, performance-leading Nortel CDMA radio subsystem at both the 800 MHz (cellular) and 1900 MHz (PCS) frequencies. CDMA was chosen for the first DMS-100 Wireless release due to its wide acceptance in the North American market—and in direct response to customer interest and input.

The Nortel CDMA radio portfolio includes the following BTS options:

- **Outdoor 1900 MHz BTS:** Fully enclosed in a hardened outdoor enclosure, this full capacity unit is designed to allow PCS service providers quick market entry. Integrated into the unit are DC rectifiers, T1 backhaul interfaces, and battery back-up.
- **Indoor 1900 MHz BTS:** Where an outdoor enclosure is not desired, this BTS offers a compact, full-capacity, cabinetized alternative ready for indoor deployment.
- **Indoor 800 MHz BTS:** This unit is designed to integrate easily into an existing cellular system with minimal footprint requirements

All Nortel BTSs are operationally compliant with IS-95A, J-STD-008, and other applicable CDMA specifications.

CDMA Benefits

- *High capacity*
- *Privacy*
- *Consistent high-quality transmission*
- *Soft hand-off capability*
- *Prolonged mobile battery life*
- *Minimal multipath effects*
- *Increased coverage*

For more information on Nortel CDMA BTSs, contact 1-800-4 NORTEL.

Key Nortel Radio System Advantages

In addition to the many revenue-generating features outlined previously, Nortel has designed a CDMA radio system that ensures the highest call quality available along with significant architecture advantages, which reduce operating costs. These include:

- **Asynchronous Transfer Mode (ATM)-Based Intersystem Links**
  All messaging, signaling and voice information is distributed via highly efficient, ATM packet-ready architecture, allowing Nortel to offer the highest capacity backhaul (i.e., cell site to central office) capability in the industry. Due to this capacity advantage, Nortel has built into the standard system package support for fractional T1 backhaul connections and "daisy-chaining" of up to three BTSs on a single T1. Leveraging this capability in network design will significantly reduce backhaul operating requirements and costs. Also, as public and private networks evolve to ATM-based architectures, Nortel ensures a simple migration path for its wireless system.
- **Distributed Processing Design**
  The Nortel radio subsystem is a purely distributed processing design—no centralized processors are used. Because resources from shared core processors are not needed, major processing speed advantages are realized. This capability, in conjunction with the short setup time facilitated by the quick ATM architecture, enables the faster handoff performance and timing that are critical to ensuring high call quality and low dropped call rates.
- **Six-Way Soft Handoff**
  The Nortel CDMA radio system supports six-way soft handoff as an additional feature designed to ensure call quality and minimize dropped calls. Soft handoff is a method for a mobile phone to simultaneously communicate with multiple BTSs while transitioning between coverage areas and while in difficult radio environments. Nortel exclusively allows up to six cell sites to be accessed, ensuring superior call quality.
- **Advanced Variable Rate Vocoder Support**
  The vocoders supported include the 8 kbps, 13 kbps PureVoice™, and soon, the Enhanced Variable Rate Coder (EVRC) to provide high-quality voice and service differentiation. CDMA voice quality is further enhanced by advanced power control and handoff management techniques unique to Nortel.

EXHIBIT F

Lucent Technologies
Bell Labs Innovations

APPLICATION GUIDE

Using Lucent CBX 500, GX 550, and MSC 25000 Multiservice WAN Switches in Wireless Networks

August 2001

Table of Contents

1. Introduction

When deploying or expanding their networks, wireless service providers need to consider which base station equipment to use and how to connect those wireless base stations over a wide geographic area. With their multiservice capability, quality of service (QoS)-based routing, carrier-class scalability, and availability, the Lucent CBX 500, GX 550, and MSC 25000 multiservice switches are just as versatile and useful in wireless networks as they are in wired environments.

This paper describes the advantages of using the CBX 500, GX 550 and MSC 25000 in wireless networks and surveys four specific applications:

- Streamlining Intra-Mobile Switching Center (MSC) Communications
- Supporting Code Division Multiple Access (CDMA) Soft Handoffs
- Providing Backhaul Aggregation
- Supporting Voice-over-Packet, Internet Access, and mobile commerce (mCommerce) Services

2. Advantages of Using CBX 500, GX 550, and MSC 25000 Switches in Wireless Networks

Many of the features that equip the CBX 500, GX 550, and MSC 25000 for use in wired multiservice networks also make them the switches of choice for wireless network deployments.

- *Absolute QoS.* The CBX 500,GX 550, and MSC 25000 can dynamically support a changing mix of ATM service class circuits. Most importantly, both switches can guarantee latency and cell delay variation for real-time variable bit rate (rt-VBR) traffic—a capability that is essential for voice. The switches' advanced traffic management and traffic engineering capabilities ensure that other traffic on the network will not interfere with high-priority voice and mCommerce traffic.

- *Carrier-Class Performance and Scalability.* The carrier-class CBX 500, GX 550, and MSC 25000 switches have been designed for high levels of performance. Key performance features on the CBX 500 include the ability to support 224,000 virtual circuits per switch and the capacity to establish up to 3,000 new switched virtual circuits (SVCs) per second—essential for voice traffic. The GX 550 offers even greater scalability, with the capacity to support up to 640,000 virtual circuits per switch (1,280,000 SVCs with Release 9.0) and establish 5,000 new SVCs per second. The MSC 25000 offers extremely high call setup and tear down rates – up to 5000 calls per second per 65/30 Service Shelf or up to 50,000 calls per second per 320 Gbps switch. The MSC 25000 also supports 128,000 VCs per OC-48, 15 million per switch.

- *Carrier-class Availability.* All the switches sustain network availability through fully redundant switch processor modules with automatic failover, hot-swappable input/output (I/O) and support modules (fans and power supplies), and multiple clock sources with automatic failover scheduling. Both also support several software-based mechanisms to redirect traffic around network failures, including Priority Rerouting, PVC Redirect, and Resilient NNI.